Trip Report
Brazil Reverse Trade Mission
May 13-16, 2001
Sponsored by the U.S. Department of Energy (DOE) and
The Gas Research Institute (GRI)

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The U.S. Department of Energy (DOE) Clean Cities Program and the Gas Research Institute (GRI) hosted a delegation from Brazil, May 13-16, 2001 on a Reverse Trade Mission focused on alternative fuel vehicles (AFVs). The Brazil Reverse Trade Mission included participants hosted by the DOE Clean Cities Program, GRI and Brazil's largest oil company, Petrobras. The participants on the Brazil Reverse Trade Mission included: Mr. Thiers Fattori Costa, National Federation of Transportation (CNT); Mr. Pedro Diogenes, Director of the National Gas Technology Center, CTGAS; Ms. Luz Dondero, Energy and Environment Researcher, University of Sao Paolo; Mr. Joao Eudes Touma, Chief, Program for the Rational Use of Petroleum and Natural Gas (CONPET); Mr. Jaime Parada, Clean Cities International Consultant, Santiago Chile; Mr. Fernando Baratelli, Gas & Power Manager, Petrobras; Mr. Tadeu Cavalcante Cordeiro de Melo, Petrobras; and Mr. Vitor Celso Ferreira IELO, Petrobras.

The Clean Cities/GRI Brazil Reverse Trade Mission was held to bring high-level industry decision makers and business representatives to the U.S. to connect with American companies offering AFV technologies that are efficient, cost-effective, environmentally sound and support principles of sustainable development. The Brazilian delegation represented organizations located in Rio de Janeiro and Sao Paulo and have a specific interest in pollution abatement in those areas.

Background

Two major problems affecting São Paulo are traffic congestion and pollution. Reported in 1999, 10 percent of city smog resulted from factories and 90 percent from motor vehicle emissions. São Paulo's pollution levels are fueled by poor infrastructure design, low vehicle fuel economy and gasoline prices which are among the lowest in the world.[i] In metropolitan São Paulo, the overwhelming air pollution problem is high ozone levels, particularly in the dry winter months. Fine particulates and carbon monoxide are also above accepted standards on an episodic basis. Although states of emergency and alert have become rare, dust levels during May through September still exceed standards on a regular basis.[ii]

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After the São Paulo Metropolitan Region, the Rio de Janeiro Metropolitan Region has the second largest concentration of vehicles and industries in Brazil and a worsening urban air pollution problem. Its uneven topography, unplanned land-use patterns, and the sea and Guanabara Bay affect the dispersion of pollutants. Air quality is worse in the northern section of Rio, affected by thermal inversions[1] between May and September, where air pollution from major emission sources cannot easily be dispersed due to incoming winds blocked by the Carioca mountain range. São Paulo and Rio de Janeiro both experience these thermal inversions.[iii]

In the late 1990s, General Motors introduced CNG-ethanol dual-fuel capability in two of its new vehicle models in Brazil. In 1997, in São Paulo, about 3,000 taxis ran on CNG-ethanol dual-fuel systems and 80 urban buses were CNG-fueled. Also reported in 1997, about 2,000 taxis in Rio de Janeiro had been retrofitted to use CNG since 1990, and 200 buses were CNG-fueled.[iv] In 1998, the City of Rio de Janeiro signed an International Council for Local Environmental Initiatives-based agreement to reduce the emissions of pollutants by 20 percent by the year 2010 (compared to 1990 levels).[v] Reported in September 2000, Brazil had 75,000 vehicles converted and 93 refueling stations.[vi]

According to conversations with delegates, compressed natural gas fuel (CNG) offers the largest market with a growth of 30 percent per year. Forecasters predict an electricity shortage in Brazil that would discourage the growth of electric vehicles (EVs). In Sao Paolo and Rio de Janeiro, there are 100,000 vehicles, 130 refueling stations, and a few conversion shops. Most conversion kits are Italian and Argentinean systems. The government of Brazil offers subsidies to consumers for conversions to AFVs. The University of Sao Paolo and Petrobras are supporting a research program to study the conversion of cars to natural gas. Delegate Luz Dondero is working on this research program.

Brazilian Participation in the 7th National Clean Cities Conference

The Technology Cooperation Agreement Pilot Project (TCAPP), coordinated by the National Renewable Energy Laboratory (NREL), contacted the Clean Cities Program in Spring 2000 regarding potential participation by a Clean Cities delegation in the International Conference on Energy Efficiency in Road Transportation held in Rio de Janeiro, Brazil in September 2000. The organizers of this conference requested participation by speakers with expertise on the potential applications of U.S. NGV technology in Brazil. During that visit, Clean Cities International representatives learned that there is significant interest on the part of fleet owners/operators and engine manufacturers in Rio de Janeiro and São Paulo, Brazil in learning more about U.S. NGV technology. The Clean Cities/GRI Brazil Reverse Trade Mission was held in follow-up to the September 2000 International Conference on Energy Efficiency in Road Transportation.

The Brazil Reverse Trade Mission delegation attended the 7th National Clean Cities Conference in Philadelphia, PA. Major auto producers including DaimlerChrysler, General Motors, American Honda, Ford Motor Company, and Toyota presented information on the newest models of AFVs available, the future of diesel fuel vs. natural gas in heavy-duty vehicles, and insights into the future of regulation for local and global pollutants related to transportation. The delegation also expressed significant interest in the Climate Change session held at the 7th

[1] Under normal conditions, when the air temperature decreases with altitude, hot pollutant gases rise to higher altitudes. Under isothermal conditions, however, where there is no change of temperature with altitude, an inversion layer forms above the ground, trapping primary pollutants and enhancing formation of secondary pollutants in the atmosphere. These conditions are of greatest concern when wind speeds are low.

National Clean Cities Conference and the potential for transportation projects to mitigate greenhouse gases (GHGs).

The Mission also included strategic meetings scheduled with industry representatives and government officials. On Monday, May 14, members of the delegation held a meeting with Al Ebron and Hank Frisz of the National Alternative Fuels Transportation Consortium in West Virginia. Some other members of the delegation held a meeting with George Sverdrup from NREL regarding a visit by a delegation from Brazil to NREL. Finally, the Brazilian delegates found particular interest in ERA Power Company's "PowerPark Technology" after visiting the exhibition booth and having discussions with the chief executives. PowerPark Technology enables a hybrid electric or (future) fuel cell equipped vehicle to produce electricity when parked for homes, offices, factories, the electric power grid, or key infrastructure components.

On Tuesday, May 15, 2001 delegates participated in a roundtable discussion on international market opportunities in Latin America. Interested representatives from CNG Services International, Inc., Intelligas, Bio-Diesel Industries, Power Designers, Questar, and Hart ARI came to meet with the delegates to discuss experiences and opportunities for business. Robert Petsinger, Chairman and CEO of CNG Services International, Inc. shared his years of work experience with alternative fuels in many Latin American countries, including Brazil and Chile. Petsinger expressed interest in partnering with Petrobras, specifically on bus conversion projects for bi-fuel and dual-fuel models. He recommended a joint-venture agreement with an in-country representative to add financial resources and assistance. In conclusion, Albert Venezio of Intelligas also shared his experiences working in Latin America. Venezio's company converts automobiles to propane and natural gas systems. Intelligas uses conversion systems manufactured in Italy and has experience in Brazil.

Conclusions

Julie Doherty and Nancy Checklick of SAIC held a meeting with the Brazilian Delegation at the conclusion of the 7th National Clean Cities Conference to discuss next steps for partnering with the Clean Cities Program. The delegation expressed a desire to work with the DOE Clean Cities Program in the following areas:

1) Participation in a year 2002 Brazilian alternative fuel vehicle (AFV) conference by Clean Cities experts in the areas of natural gas light and heavy-duty vehicles, bio-fuels, and sharing the Clean Cities Program model with private and public sector representatives in Brazil;

2) Creation of a demonstration project in Brazil using a Toyota Prius and a natural gas truck provided by a U.S. manufacturer;

3) Formation of a training partnership with Clean Cities technical experts for drivers and mechanics of natural gas buses in Brazil; and

4) Sharing of information on future Clean Cities events and AFV related events in Brazil.

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[i] U.S. Energy Information Administration, Country Analysis Brief, Brazil: Environmental Issues, December 1999. http://www.eia.doe.gov/emeu/cabs/brazenv.html

[ii] U.S. Department of Commerce, International Trade Administration, Trade Development, Market Plan, Environmental Technology Industries, Brazil Environmental Export Market Plan, III. Market by Sector. http://infoserv2.ita.doc.gov/ete/eteinfo.nsf/176f49cad3125d5f85256892007bca91/176bb39f72b2484b852565d8004b3f88!OpenDocument

[iii] World Bank Technical Paper No. 373, *Vehicular Air Pollution: Experiences from Seven Latin American Urban Centers*, September 1997, pg. 24. http://www-wds.worldbank.org/pdf_content/000009265397111010141450/multi_page.pdf

[iv] World Bank Technical Paper No. 373, *Vehicular Air Pollution: Experiences from Seven Latin American Urban Centers*, September 1997, pg. 92. http://www-wds.worldbank.org/pdf_content/000009265397111010141450/multi_page.pdf

[v] A speech by, Mauricio Lobo, Secretário Municipal de Meio Ambiente Secretariat of Environment of Rio de Janeiro, Brazil, posted on The World Bank Group, Clean Air Website. http://wbln0022.worldbank.org/cleanair/cleanair.nsf/fff8e54d4744f30a8525690b000e9ce5/0757651832d251df8525694b00706c41?OpenDocument

[vi] International Association of Natural Gas Vehicles, International Natural Gas Vehicle Statistics. http://www.iangv.org/html/ngv/stats.html